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| SERIAL NUMBER | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. |
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08/453,732 05/30/95 FULKS

R. JAO-34050

EXAMINER

ESM1/0419

TON M

ART UNIT PAPER NUMBER

OLIFF AND BERRIDGE
P O BOX 19928
ALEXANDRIA VA 22320

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2515

DATE MAILED:

04/19/96

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

This application has been examined Responsive to communication filed on _____ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. Notice of References Cited by Examiner, PTO-892.
2. Notice of Draftsman's Patent Drawing Review, PTO-948.
3. Notice of Art Cited by Applicant, PTO-1449.
4. Notice of Informal Patent Application, PTO-152.
5. Information on How to Effect Drawing Changes, PTO-1474.
6.

Part II SUMMARY OF ACTION

1. Claims 1-13 are pending in the application.
Of the above, claims _____ are withdrawn from consideration.
2. Claims _____ have been cancelled.
3. Claims _____ are allowed.
4. Claims 1-4, 6-9, 12-13 are rejected.
5. Claims 5, 10-11 are objected to.
6. Claims _____ are subject to restriction or election requirement.
7. This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. Formal drawings are required in response to this Office action.
9. The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are acceptable; not acceptable (see explanation or Notice of Draftsman's Patent Drawing Review, PTO-948).
10. The proposed additional or substitute sheet(s) of drawings, filed on _____, has (have) been approved by the examiner; disapproved by the examiner (see explanation).
11. The proposed drawing correction, filed _____, has been approved; disapproved (see explanation).
12. Acknowledgement is made of the claim for priority under 35 U.S.C. 119. The certified copy has been received not been received been filed in parent application, serial no. _____; filed on _____.
13. Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. Other

Drawings

1. This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

2. The drawings are objected to because they do not include certain reference signs mentioned in the description. 37 CFR § 1.84(f) states, "Reference signs not mentioned in the description shall not appear in the drawing and vice versa." The following reference signs are not included in the drawings:

"58" of Figure 3B;
"40", "562", "564" of Figure 3C;
"172" of Figure 7.

Correction is required.

3. The drawings are objected to because right "56" of Figure 3C should be changed to --566-- . Correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

5. Claims 1-4, 6-7, 9 & 12 are rejected under 35 U.S.C. § 103 as being unpatentable over Naito [PN 5334860] in view of Hayashi et al [PN 5208690].

Naito discloses in column 4, line 40 to column 6, line 41 & shows in Figure 6 an active matrix liquid crystal display device comprising :

gate electrodes G1 & gate lines formed over a substrate 11 using a first mask (see column 6, lines 49-68);

an etch stopper "a" formed over the gate electrode using a second mask (see column 7, first paragraph & Figure 9B);

a gate insulating layer 15 made of SiN formed over the gate electrode G1 & gate lines;

drain electrodes 18 formed over a first portion of the etch stopper & source electrodes 17 formed over a second portion of the etch stopper, wherein both are formed in the same manner as the gate electrodes & gate lines (see column 8, lines 27-28);
pixel electrode 12 formed over the gate insulator layer.

It is conventional that pixel electrodes are made of ITO. Therefore, it would have been obvious for the pixel electrodes to be made of ITO.

The limitations not disclosed by Naito are as follows :

(1) a passivation layer having a contact hole being formed over the drain & source electrodes using a mask; (2) the pixel electrode having a contact hole being formed over the passivation layer using a mask, (3) an etching rate of the passivation layer being at least an etching rate of the gate insulating layer.

It is well known in the art to use a passivation/insulating layer for protecting TFTs from damage/deterioration.

Hayashi et al show in Figure 5 that two contact holes are formed through an insulating layer at the portion corresponding to a drain of a switching TFT & that the pixel electrode is connected to the drain via the two contact holes. Hayashi et al disclose in column 5, first paragraph how the contact holes are formed using the mask.

Therefore, it would have been obvious to one of ordinary skill in the art to employ a passivation layer over the drain & source electrodes for the purpose of preventing TFTs from deteriorating. Furthermore, it would have been obvious to employ

a mask so that masking-areas can be protected from the etching-process, as shown by Hayashi et al.

In regard to "etching rate", it is conventional in the art that the gate insulating layer is made of SiO, SiN, SiO₂, etc. Hayashi et al disclose the insulating/passivation layer 11 made of SiN, since both are made from the same material, one of ordinary skill in the art would expect both to have the same etch rate. Further, it would have been obvious to use materials with the same etch rate to be able to etch them simultaneously for the purpose of reducing a manufacturing steps of the device, which is known as a common goal in the art.

6. Claims 8 and 13 are rejected under 35 U.S.C. § 103 as being unpatentable over Naito in view of Hayashi et al as applied to claims 1-2, 4, 6-7, 9 & 12 above, and further in view of Kaganowicz et al [PN 4717631] & Iwasaki et al [PN 5316956].

It is conventional in the art that the passivation or insulating layer is made of SiO, SiN, SiO₂ formed at a temperature of 200°C. Kaganowicz et al disclose in column 4, lines 1-18 that a passivation layer made of silicon oxynitride is formed at a temperature 25-200°C. Iwasaki et al [PN 5316956] disclose in column 6, lines 13-17 that the insulating film consisting of such a material as SiO₂, SiON or SiN is formed at a

temperature of 200-300°C. Therefore, it would have been obvious to form a passivation layer at a temperature of 200°C.

Allowable Subject Matter

7. Claims 5, 10-11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Nasu et al [PN 5496752] disclose method of manufacturing TFTs in a liquid crystal display apparatus.

Park et al [PN 5478766] disclose process for formation of thin film transistor liquid crystal display.

Yamazaki et al [PN 5468987] disclose semiconductor device & method for forming the same.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to T. TON whose telephone number is (703) 305-3489.

Serial Number: 08/453732
Art Unit: 2515

-7-

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

T. TON
April 8, 1996

Anita P. Gross
ANITA PELLMAN GROSS
PRIMARY EXAMINER
GROUP 2500